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July 19, 2004

Via Federal Express
Noboru Otsuka
Hitachi, Ltd.
IP Development & Management Division
Patent Dept. 4
292, Yoshida-cho, Totsuka, Yokohama-shi

Kanagawa, Japan 244-0817

RE: PATENTABILITY SEARCH FOR EXTERNAL STORAGE AND DATA RECOVERY METHOD FOR EXTERNAL STORAGE AS WELL AS PROGRAM
Your File: 340201769US01
Our Docket: PSP-1041612

Dear Mr. Otsuka:

In accordance with your request, we have conducted a patentability search on the above-identified subject matter.

Enclosed with this report are copies of the search results and your disclosure materials. If after reviewing the results, you feel that the search feature (or specific search elements), the field of search, or results are not commensurate with your original request, or you would like to extend the search into additional areas, please contact us.

Sincerely,

Randy W. Lacasse

Enclosures
RWL:JT:eah
s04/psp1041612

CONFIDENTIAL
(Patentability Search)

I. SEARCH FEATURE

A. General

External storage and data recovery method for external storage as well as program

B. Specific

An external storage to be connected to a host computer, comprising:

storing means which stores data to be used by the host computer; and
control means which controls the storing means, wherein the control means comprises:

registering means which registers a recoverable point to be set by the host computer concerning data stored in the storing means;
information for selection sending means which sends information for selection at the registered recoverable point to the host computer in response to a request form the host computer; and
recovering means which recovers data designated by the host computer to a designated recoverable point on the basis of the information for selection at the recoverable point.

II. FIELD OF SEARCH

The search of the above features was conducted in the following areas:

A. Classification search

Class	Subclasses	Description
707/		DATA PROCESSING: DATABASE AND FILE MANAGEMENT OR DATA STRUCTURES
	202	.. Recoverability
	203	.. Version management
	204	.. Archiving or backup
711/		ELECTRICAL COMPUTERS AND DIGITAL PROCESSING SYSTEMS: MEMORY
	112	... Direct access storage device (DASD)

Class	Subclasses	Description (continued)
	161	.. Archiving
	162	... Backup
714/		**ERROR DETECTION/CORRECTION AND FAULT DETECTION/RECOVERY**
	2	.. Fault recovery
	13	..... Prepared backup processor (e.g., initializing cold backup) or updating backup processor (e.g., by checkpoint message)
	15	... State recovery (i.e., process or data file)
	20	.... Plural recovery data sets containing set interrelation data (e.g., time values or log record numbers)

The above subclasses represent areas deemed to contain subject matter of interest to one or more of the search features. Please note that relevant references may be classified outside of these areas. The integrity of the search is based on the records as presented to us by the United States Patent and Trademark Office (USPTO). No further integrity studies were performed. Also a key word search was performed on the USPTO full-text database including published U.S. patent applications.

III.   RESULTS OF SEARCH

A.   References developed as a result of search (related art is in boldface):

U.S. Patent No.	Inventor
6,269,431 B1	**Dunham**
6,397,308 B1	Ofek et al.
6,691,245 B1	**DeKoning**

U.S. Patent Application Publication No.	Inventor
2004/0059869 A1	**Orsley**
2004/0117572 A1	Welsh et al.

B.   Discussion of related references in numerical order:

The patent to Dunham (6,269,431 B1), assigned to EMC Corporation, provides for *Virtual Storage and Block Level Direct Access of Secondary Storage for Recovery of Backup Data.* Disclosed is a method where a host processor may transmit a request for assignment of a virtual storage address for a backup version,

as specified by the host processor; backup version being contained in the secondary data storage, which may be accessed via storage access requests that are transmitted from the host processor to the data storage subsystem. The data storage subsystem may then assign a virtual storage address to specified backup version from which host processor will then access the backup version (see column 2, lines 2-14).
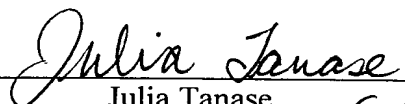
The patent to DeKoning (6,691,245 B1), assigned to LSI Logic Corporation, provides for *Data Storage with Host-Initiated Synchronization and Fail-Over of Remote Mirror*. Discussed is a "checkpoint", otherwise known as the time at which data synchronization occurs. The remote storage device may maintain a "snapshot" of the data at the latest checkpoint state. In the event of a fail-over condition, the remote host device may "roll back" the state of the data stored on the remote storage device to the last common checkpoint state. Snapshots **148** and **150** may comprise a "rolling" repository of preexisting data from the mirrored volumes **132** and **134**, so that multiple checkpoints are maintained with "markers" set that may indicate each of the checkpoints. A marker is a label or demarcation in a log of snapshots **148** and **150** that may indicate where one checkpoint ends and another begins. In this manner, the remote storage device **110** may roll back to any marker, or checkpoint, depending on the point at which data is considered to be more "valid" (see figure 2; column 2, lines 25-29 and 38-42; column 7, lines 41-50).

The patent application publication to Orsley (2004/0059869 A1) provides for an *Accelerated RAID with Rewind Capability*. Discussed is a mirror area, which may act as a temporary store for a log. If a baseline backup of an entire RAID subsystem stripe is created just before the log files are archived, each successive state of the RAID subsystem can be recreated by re-executing the write requests within the archived log files. This would allow any earlier state of the stripe of the RAID subsystem to be recreated (see paragraph 14).

C.   Discussion of background references in numerical order:

The patent to Ofek et al. (6,397,308), assigned to EMC Corporation, provides for an *Apparatus and Method for Differential Backup and Restoration of Data in a Computer Storage System*. Discussed is a method for sending a copy of data from a storage element of a computer system. Storage device may include means for identifying data blocks that have changed since an earlier point in time and means for transmitting a differential abstract block set from memory. A metadata segment may be stored on readable media to identify data blocks of the logical object in data segments. Metadata data may be provided to identify the order of data stored in the identified storage segments in the logical object (see column 9, lines 26-27 and 61-65; column 10, lines 47-49; and column 11, lines 58-60).

The patent application publication to Welsh et al. (2004/0117572 A1), assigned to Columbia Data Products, Inc., provides for *Persistent Snapshot Methods*. Discussed is a snapshot that may be periodically "taken" so that a computer system can be restored in event of failure. A PSM module **220** in conjunction with operation system **210** may be able to display current and historical snapshot information by accessing both active user and system data **235** and snapshot caches **252**, **254** and **256** (see figure 2 and paragraphs 51 and 53).

Julia Tanase